



Nebraska  
Center  
for  
Rural  
Health  
Research

**The Financial Impact of CAH Conversion  
on Rural Hospitals in Nebraska:  
A Report to the Nebraska CAH  
Steering Committee**

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Prepared by  
Li-Wu Chen, Ph.D.  
Keith Mueller, Ph.D.  
Susan Puumala, M.S.  
Julie Stoner, Ph.D.  
Catherine Makhanu, M.S.  
Liyang Xu, M.S.

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Specific projects that the center has undertaken include analysis of national health policy, studies of market-driven change in rural areas, studies of use of services by the elderly, and studies of access to, and utilization of health services by minority populations.

*Comments/questions should be directed to:*

Nebraska Center for Rural Health Research  
University of Nebraska Medical Center  
Department of Preventive & Societal Medicine  
984350 Nebraska Medical Center  
Omaha, NE 68198-4350

Phone: (402) 559-5260

Fax: (402) 559-7259

Email: [kmueller@unmc.edu](mailto:kmueller@unmc.edu)

web site: <http://www.unmc.edu/rural>

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## **Executive Summary**

Converting to Critical Access Hospital (CAH) status has improved the financial viability (e.g., profitability and cash flow) of rural hospitals in Nebraska. Statistical analysis using audited hospital financial statement data and AHA survey data shows that the financial performance of CAHs in Nebraska trended downward before conversion and upward since conversion. The findings are summarized as follows:

- The total margin and return on equity of CAHs in Nebraska showed a statistically significant increase from any of the three pre-conversion years and the conversion year to the first year after the conversion year.
- The current ratio and cash flow to total debt of the CAHs in Nebraska showed a statistically significant increase from either of the two years before the conversion year and the conversion year to the first year after conversion.
- The days cash on hand and total asset turnover of the CAHs in Nebraska did not show a statistically significant increase from any of the three pre-conversion years and the conversion year to the first year after the conversion year.

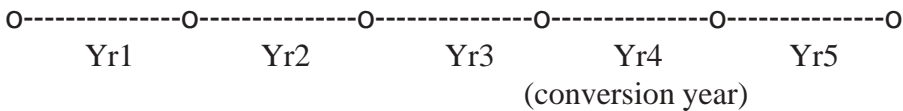
**Introduction**

As one of the ongoing efforts in the evaluation of the state’s Medicare Rural Hospital Flexibility Grant activities, this report summarizes the design, method, and findings of our study, which investigated the financial impact that converting to Critical Access Hospital (CAH) status had on rural hospitals in Nebraska. In site visits to five CAHs in 2000 and 2001, we found that the financial viability of those CAHs generally improved after their conversion to CAH status. The study presented in this report went a step further and used statistical methods to quantify the improvement in financial performance of Nebraska rural hospitals after their conversion to CAHs.

**Study Design**

To examine the impact of CAH conversion on hospital financial performance, we conducted a statistical regression analysis using five years of data on financial measures and hospital characteristics for a sample of 45 CAHs in Nebraska. Because we collected data covering a pre-conversion period (i.e., years 1 through 3), the conversion year (i.e., year 4), and a post-conversion period (i.e., year 5), we were able to investigate the impact of CAH conversion by tracking the change in financial performance of these 45 hospitals before and after the conversion (see Figure 1). Although CAH conversion may be the greatest force driving the financial performance of these hospitals during this five-year period, a wide variety of other factors may also affect their financial bottom line. Therefore, we used information that described hospital characteristics to account for possible confounding factors in the regression analysis.

**Figure 1. Time Frame of the Study**



**Data**

The hospital financial data used in this study came mainly from the Nebraska Hospital Association and included reported financial ratios and raw data (in terms of audited financial statements) of the 45 CAHs, covering fiscal years ending in 1997, 1998, 1999, 2000, and 2001. Of the 45 hospitals studied, 32 converted to CAHs sometime during their fiscal year 2000, while the other 13 hospitals converted to CAHs sometime during their fiscal year 2001. Because we needed financial data that covered at least one year post–CAH conversion, we requested audited financial statements for fiscal year 2002 directly from the 13 hospitals that converted during fiscal year 2001. Therefore, there were two cohorts of hospitals within our study sample based on the fiscal year of CAH conversion. In addition, the information about hospital characteristics was extracted from the American Hospital Association annual survey data sets.

## Method

### Variables

#### *Dependent Variables*

The following six financial ratios that measure hospital financial performance were used as the dependent (or outcome) variables in this study: total margin, return on equity, current ratio, days cash on hand, cash flow to total debt, and total asset turnover.

#### *Explanatory Variables*

*Study-year variables.* The study-year variables were the key explanatory variables in this study. Because our data covered a five-year period including three pre-conversion years, the conversion year, and one post-conversion year for all 45 hospitals under study, we standardized the five study years to facilitate statistical analysis. In other words, for all 45 hospitals, years 1, 2, and 3 represent the three years before CAH conversion, year 4 represents the conversion year, and year 5 represents the year after CAH conversion. Using year 5 as the reference group, four study-year variables (i.e., years 1 through 4) were used in the regression analysis. The regression coefficients for each study-year variable (e.g., year 3) would indicate, on average, the difference in financial performance between the study-year of interest and year 5, thus providing inferences on the effect of CAH conversion on hospital financial performance.

*Hospital characteristics.* A few variables that describe the characteristics of the 45 hospitals under study were extracted and created from the American Hospital Association annual survey data sets. These variables included ownership (government-owned vs. private-owned), number of hospital beds set up and staffed, occupancy rate, whether a hospital maintained a nursing home unit, percentage of inpatient days as Medicare days, percentage of inpatient days as Medicaid days, average length of stay for Medicare patients, percentage of surgeries performed in an outpatient setting, emergency room visits as a percentage of outpatient visits, and average FTE hospital personnel per hospital bed.<sup>1</sup> These variables were included in the regression analysis because of the possibility that they could explain the variation in financial performance among hospitals.

*Operating environment variables.* Since the operating environment could also affect the financial performance of hospitals, we included the following three variables in our analysis to measure the operating environment of the county where a hospital was located: percentage of the population who were elderly (i.e., aged 65 and above), unemployment rate, and whether there was more than one hospital in the county.

*Early/Late conversion variable.* As mentioned earlier, the study sample contained two cohorts of hospitals. The first cohort (32 hospitals) converted to CAHs during their fiscal year 2000, while the second cohort (13 hospitals) converted to CAHs during their fiscal year 2001. Because the decision to seek CAH designation earlier or later may reflect the financial situation of hospitals as well as affect the impact of conversion, we created a dichotomous variable to proxy whether a hospital was converted earlier (i.e., in fiscal year 2000) or later (in fiscal year 2001).

<sup>1</sup>Three variables were excluded from the analysis because of a significant amount of missing data. They were whether a hospital was a member of a system, whether a hospital was contract managed, and the total number of services offered in a hospital.

## Data Analysis

In order to account for the correlation in the same hospital for different years, we used a generalized estimating equations (GEE) approach to conduct the statistical regression analysis. A backwards selection modeling was used to select and finalize the regression model, which only included the statistically significant predictor variables for each of the six financial outcome variables. We first analyzed the whole sample of 45 hospitals, and then focused our analysis on the sub-sample of the hospitals (about two-thirds of the whole sample) that did not maintain a nursing home unit.

## Results

### Whole Sample

#### *Total Margin*

Table 1 shows the variables that were found to be statistically significant predictors of the total margin of the CAHs in the study sample. The results can be summarized as follows:

- The total margin of the CAHs in Nebraska showed a statistically significant increase from any of the three pre-conversion years and the conversion year to the first year after conversion. The statistical results showed that the increase in total margin was greatest if compared to the year before the conversion year (i.e., an increase of 6.85 percentage points).
- The CAHs that sought earlier conversion had a statistically lower total margin than did the CAHs that converted later, by an average of 3.79 percentage points.
- The CAHs that maintained a nursing home unit had a statistically higher total margin than the CAHs that did not, by an average of 2.41 percentage points.

**Table 1. Regression Results on the Predictors of the Total Margin of CAHs**

Variable	Regression Coefficient	Standard Error
Study Year 1	-2.95***	0.95
Study Year 2	-6.13***	1.03
Study Year 3	-6.85***	0.85
Study Year 4 (Reference: Study Year 5)	-3.12***	0.92
Early Conversion (Reference: Late Conversion)	-3.79***	1.35
Having Nursing Home Unit (Reference: No)	2.41*	1.26

\*Significant at  $p < 0.10$ ; \*\*Significant at  $p < 0.05$ ; \*\*\*Significant at  $p < 0.01$

### ***Return on Equity***

Table 2 shows the variables that were found to be statistically significant predictors of the return on equity of the CAHs in the study sample. The results can be summarized as follows:

- The return on equity of the CAHs in Nebraska showed a statistically significant increase from any of the three pre-conversion years and the conversion year to the first year after conversion. The statistical results showed that the increase in the return on equity was greatest if compared to the year before the conversion year (i.e., an increase of 12.74 percentage points).
- The CAHs that maintained a nursing home unit had a statistically higher return on equity than the CAHs that did not, by an average of 4.20 percentage points.
- The CAHs that served a county population with a higher percentage of the elderly (i.e., aged 65 and above) had a statistically lower return on equity than did their counterpart facilities serving a county population with a lower elderly percentage.

**Table 2. Regression Results on the Predictors of the Return on Equity of CAHs**

Variable	Regression Coefficient	Standard Error
Study Year 1	-5.35***	1.64
Study Year 2	-10.60***	2.02
Study Year 3	-12.74***	1.90
Study Year 4	-8.15***	1.95
(Reference: Study Year 5)		
Having Nursing Home Unit (Reference: No)	4.20***	1.56
Percentage of County Residents as the Elderly	-0.48**	0.19

\*Significant at  $p < 0.10$ ; \*\*Significant at  $p < 0.05$ ; \*\*\*Significant at  $p < 0.01$

### ***Current Ratio***

Table 3 shows the variables that were found to be statistically significant predictors of the current ratio of the CAHs in the study sample. The results can be summarized as follows:

- The current ratio of the CAHs in Nebraska showed a statistically significant increase from either of the two pre-conversion years (but not from year 1) and the conversion year to the first year after conversion. The statistical results showed that the increase in the current ratio was greatest if compared to the second year before the conversion year.
- The CAHs that had more than 50% Medicare inpatient days had a statistically lower current ratio than did their counterpart facilities that had less than 50% Medicare inpatient days.
- The CAHs that served a county population with a higher percentage of the elderly (i.e., aged 65 and above) had a statistically lower current ratio than did their counterpart facilities serving a county population with a lower elderly percentage.

**Table 3. Regression Results on the Predictors of the Current Ratio<sup>2</sup> of CAHs**

Variable	Regression Coefficient	Standard Error
Study Year 1	<i>not significant</i>	—
Study Year 2	-0.19***	0.06
Study Year 3	-0.18***	0.06
Study Year 4	-0.10***	0.03
(Reference: Study Year 5)		
>50% of Inpatient Days as Medicare Days (Reference: <50%)	-0.09**	0.04
Percentage of County Residents as the Elderly	-0.04***	0.01

\*Significant at  $p < 0.10$ ; \*\*Significant at  $p < 0.05$ ; \*\*\*Significant at  $p < 0.01$

### ***Days Cash on Hand***

The regression results show no statistically significant increase in the ratio of days cash on hand from any of the three pre-conversion years and the conversion year to the year after conversion. The only significant predictor for the days cash on hand of CAHs was the percentage of outpatient visits as ER visits, with the result that a higher percentage of ER visits was associated with a greater ratio of days cash on hand.

### ***Cash Flow to Total Debt***

Table 4 shows the variables that were found to be statistically significant predictors of the cash flow to total debt of the CAHs in the study sample. The results can be summarized as follows:

- The cash flow to total debt of the CAHs in Nebraska showed a statistically significant increase from either of the two pre-conversion years (but not from year 1) and the conversion year to the first year after conversion. The statistical results showed that the increase in the cash flow to total debt was greatest if compared to the second year before the conversion year.
- The CAHs that served a county population with a higher percentage of the elderly (i.e., aged 65 and above) had a statistically lower cash flow to total debt than did their counterpart facilities serving a county population with a lower elderly percentage.

<sup>2</sup>The logarithm of the current ratio was used as the dependent variable in the regression analysis.



**Table 4. Regression Results on the Predictors of the Cash flow to Total Debt of CAHs**

Variable	Regression Coefficient	Standard Error
Study Year 1	<i>not significant</i>	—
Study Year 2	-28.88***	7.80
Study Year 3	-26.07***	6.68
Study Year 4	-16.66***	5.61
(Reference: Study Year 5)		
Percentage of County Residents as the Elderly	-2.11**	0.97

\*Significant at  $p < 0.10$ ; \*\*Significant at  $p < 0.05$ ; \*\*\*Significant at  $p < 0.01$

### ***Total Asset Turnover***

The regression results show that there was no statistically significant increase in the ratio of total asset turnover from any of the three pre-conversion years and the conversion year to the first year after conversion. The only significant predictors for the total asset turnover were early/late conversion, percentage of ER visits, and unemployment rate of the county served by the CAH.

### **Sub-sample**

Another series of analysis was conducted using only those hospitals that did not maintain a nursing home unit. The rationale for doing this was to study the more direct effect of CAH conversion on the financial performance of the hospital unit. This analysis showed quite consistent results as compared with the analysis using the whole sample. Because the analysis of the whole sample provides a greater statistical power, this report focuses on the results from the whole sample, and presents the results on two ratios from the sub-sample for comparison only. Tables 5 and 6 show the regression results of the predictors of the total margin and return on equity for the CAHs that did not maintain a nursing home unit. These regression results were very consistent with those from the whole sample except that the magnitude of effect (i.e., the value of coefficient) was a little stronger in the sub-sample models. This finding may reflect the stronger financial impact of CAH conversion on the hospital unit than on the whole facility, given that a facility may contain a nursing home unit.

**Table 5. Regression Results on the Predictors of the Total Margin of CAHs That Did Not Maintain a Nursing Home Unit**

Variable	Regression Coefficient	Standard Error
Study Year 1	-2.18*	1.14
Study Year 2	-7.63***	1.20
Study Year 3	-7.67***	0.96
Study Year 4	-3.19***	1.17
(Reference: Study Year 5)		
Early Conversion (Reference: Late Conversion)	-4.34***	1.41

\*Significant at  $p < 0.10$ ; \*\*Significant at  $p < 0.05$ ; \*\*\*Significant at  $p < 0.01$

**Table 6. Regression Results on the Predictors of the Return on Equity of CAHs That Did Not Maintain a Nursing Home Unit**

Variable	Regression Coefficient	Standard Error
Study Year 1	-4.80**	1.94
Study Year 2	-12.58***	2.37
Study Year 3	-12.90***	2.12
Study Year 4 (Reference: Study Year 5)	-8.76***	2.15
Percentage of County Residents as the Elderly	-0.76***	0.25

\*Significant at  $p < 0.10$ ; \*\*Significant at  $p < 0.05$ ; \*\*\*Significant at  $p < 0.01$

## Conclusion

In general, the financial performance (e.g., total margin, return on equity, current ratio, and cash flow to total debt) of CAHs in Nebraska trended downward before CAH conversion, upward in the conversion year, and continuously upward during the first year after conversion. This pattern suggests that converting to CAH status has improved the financial viability of rural hospitals in Nebraska. Having higher profitability and more cash flow would help CAHs recruit and retain competent staff and personnel, modernize equipment and buildings, and increase the scope and quality of hospital services. We observed such improvements during our site visits in 2000-2001. The findings of this quantitative analysis further confirmed that the conversion to CAH status has given hospitals more financial resources with which to make changes and improve services to the communities where they are located.